

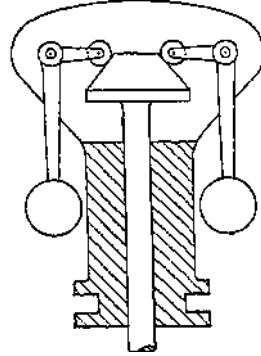
# THE RECIPROCATING STEAM-ENGINE

$N^2:n^2$  est position:  
 $N^2:490$   
 0

$N$   
 $2$

Sensitiveness for unloaded type =  $\frac{vO}{X} \times 100 = 15.4$  per cent,  
 and for loaded type =  $\frac{vO}{X} \times 100 = 15.4$  per cent

Fig. 23.—Loaded Type of



The loaded governor is therefore not more sensitive than the unloaded type. It is simply "powerful", and can exert a bigger pull or push.

Loading a governor is an artifice for removing the natural range of operation of a high-speed governor where the height and the ratio *change of*

*height/*  
*change of speed* is small, to a lower position of the arm where that ratio is greater. The higher speed of rotation gives greater centrifugal force, and this, together with the greater change of height for any chosen percentage of variation, gives more "power". Sometimes a spring is used, either instead of a control weight or supplementary to it. This arrangement diminishes somewhat the sensitiveness of the governor, as the ratio *change in height/percentage change*

Fig. 24.—Governor Mechanism by Hicks, Hargreaves & Co., Ltd.

*in speed* is less.

Taking similar governors in the lowest position, the force on the collar, to maintain equilibrium with the centrifugal forces in the balls, must be the same whether springs or weights or both be

used. A spring must have a certain initial compression or tension to give this force, and as the balls move outwards the force exerted by the spring